

WHAT IS CLAIMED IS:

1. A film forming method for an optical multilayer filter having a predetermined number of layers in which the optical thickness of each of said layers of a  $\lambda/4$ -orientate structure is determined by its optimization in the neighborhood of  $\lambda/4$ , said method comprising the steps of:

(a) determining the wavelength of monitor light for said each layer of optimized thickness so that the transmittance or reflectivity of an interim multilayer film with said each layer formed as the outermost layer reaches an extreme value;

(b) setting the wavelength of monitor light to be emitted from a variable wavelength light source to said wavelength determined in said step (a) at the time of forming said each layer, detecting transmitted light through or reflected light by said interim multilayer irradiated with said monitor light, and deciding whether said detected output has reached an extreme value;

(c) stopping the formation of said each layer when it is decided that said extreme value has been reached; and

(d) repeatedly performing said steps (b) and (c) by a predetermined number of layers.

2. The method of claim 1, wherein said step 8a) includes a step of, letting two wavelengths in the variable wavelength range of said variable wavelength light source being represented by  $\lambda_1$  and  $\lambda_2$ , optimizing said each layer within the range of  $\lambda_1/4$  to  $\lambda_2/4$ .

3. The method of claim 1, wherein said step (a) includes a step of storing a waveform determined for said each layer in a memory and said step (b) includes a step of reading out of said memory the wavelength corresponding to said each layer.

4. A film forming apparatus for an optical multilayer filter having a

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predetermined number of layers in which the optical thickness of each of said layers of a  $\lambda/4$ -orientate structure is determined by its optimization in the neighborhood of  $\lambda/4$ , said apparatus comprising:

a film forming apparatus main unit provided with a chamber in which layers of a multilayer film are formed on a substrate in a sequential order;

a variable wavelength light source for emitting variable wavelength monitor light;

wavelength setting means for setting the wavelength of said variable wavelength light source, for the optical thickness of said each layer to be formed, to a wavelength at which the transmittance or reflectivity of an interim multilayer film with said each layer formed as the outermost layer reaches an extreme value;

an optical thickness monitor for detecting transmitted or reflected light of said monitor light incident on said interim multilayer film during the formation of said each layer and deciding whether said transmittance or reflectivity of said interim multilayer film has reached said extreme value; and

a control device for effecting control to stop the formation of said outermost layer when it is decided by said optical thickness monitor that said transmittance or reflectivity of said interim multilayer film has reached an extreme value.

5. The apparatus of claim 4, wherein said variable wavelength light source is a variable wavelength laser light source.